CHEMISTRY RESEARCH INSTRUMENTATION AND FACILITIES

Program Announcement

DIVISION OF CHEMISTRY

Deadlines for Submission:

- Departmental Multi-User Instrumentation: Second Monday of January, Annually
- Departmental Research Instrumentation for Use by Junior Faculty: First Monday of July, Annually
- Instrumentation Development: Second Monday of January, Annually
- Chemistry Research Facilities:
  Pre-Proposals: December 1st, Annually
  Full Proposals: June 1st, Annually

NATIONAL SCIENCE FOUNDATION

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CHEMISTRY RESEARCH INSTRUMENTATION AND FACILITIES

PROGRAM PURPOSE AND DEFINITIONS

Research and education in the chemical sciences depend critically on access to state-of-the-art instrumentation, from small equipment items used in individual research projects to major instruments shared and maintained for multiple uses by many researchers. Specialized equipment dedicated for use in particular chemistry research projects is normally funded as part of individual investigator awards, along with personnel and other direct project costs.

The Chemistry Research Instrumentation and Facilities (CRIF) Program of the National Science Foundation (NSF) provides funds to research institutions and consortia thereof for the purchase of multi-user instruments, for Junior faculty, for major instrumentation development and construction, and for the establishment and support of multi-user research facilities in the chemical sciences. This Program is structured to enable the National Science Foundation, through its Division of Chemistry, to respond to a variety of needs for infrastructure to undergird advanced research and education in chemistry. The NSF Division of Chemistry supports graduate education and research activities in analytical, inorganic, organic, physical, materials, and surface chemistry. Instrumentation for related fields of research is provided through other NSF programs (see section on **Other NSF Instrumentation Programs** for details).

For all sections of this announcement, a statement of institutional commitment and budget is required. The signature of the authorized institutional representative commits the institution to provide the matching funds specified in the budget; the source of the funds need not be identified, except for instrumentation facilities. Matching funds must be in cash, not in kind and be used towards the instrument(s) purchase.

The CRIF Program is designed to support the following types of academic instrumentation research needs:

1. Purchase or upgrade of departmental multi-user instrumentation;

2. Purchase of departmental research instrumentation for use by junior faculty in establishing their academic careers;

3. Development of Instrumentation, including the construction of new prototype instruments; and

4. Establishment and support of unique national or regional instrumentation facilities.

Proposals in all four categories will be evaluated using the general NSF criteria, particularized for each specific category. The general criteria are:

Criterion 1. What is the intellectual merit of the proposed activity?

Potential considerations: How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, please comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to the necessary resources?

Criterion 2. What are the broader impacts of the proposed activity?

Potential considerations: How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Other criteria are described in the Grant Proposal Guide (NSF 98-2), which is referred to as GPG below.

This Program Announcement describes what should be provided under each of these four rubrics, stipulates the guidelines that proposals must follow,

and provides necessary information about review and award procedures. This Program Announcement replaces NSF 97-2.

1. PURCHASE OR UPGRADE OF DEPARTMENTAL MULTI-USER INSTRUMENTATION

Proposals will be considered for purchase or significant upgrade of major research instruments for use by a chemistry department or other group of chemists.

For all such multi-user instrumentation proposals, the head or chairperson of the department must act as the Principal Investigator. Instruments awarded under this program are intended as assistance to a department or a group of investigators; they would not move to a new institution with any investigator. Group proposals for instruments to be used primarily in research not normally supported by the Chemistry Division should be directed to the appropriate NSF division (see Other NSF instrumentation programs). However, multi-disciplinary proposals in which the majority of the proposed research is in areas of science supported by the Division of Chemistry will be considered. With the exception of proposals for the purchase of departmental research instrumentation for use by junior faculty in establishing their academic careers, proposals for instrumentation primarily for the benefit of one investigator are inappropriate for this program; however, such proposals will be considered by the appropriate subdisciplinary program within the Division, provided the research of the investigator is already supported through that program.

Deadline for Submission

Proposals to purchase or upgrade departmental multi-user instrumentation must be received at NSF by the second Monday in January, annually. Principal investigators will be notified of the Foundation's intended action on their proposals by the second Monday in June of that year.

Eligible Costs

The CRIF Program will support successful proposals only in proportion to expected usage of the requested instrumentation in research appropriate for Chemistry Division funding. For all proposals to purchase, develop, or upgrade instrumentation, the Chemistry Division requires no matching funds for the first $80,000; it will provide a maximum of one-half of the funds in excess of $80,000 required for the purchase or upgrade of instrumentation. Matching funds must be in cash, and be used towards the instrument(s) to be purchased, not in-kind. The NSF award amount will be based on the net price to the institution, less any applicable academic discounts. Funding for smaller items, such as dedicated, special-purpose instrumentation, should be included in the direct costs in research proposals from individuals or small groups; not as part of the CRIF program. However, it is appropriate to submit a request for an ensemble of smaller items that together will constitute a major, multi-use instrument system (e.g., a departmental computer system comprising workstations in different locations). Requests for multi-year funding for a coordinated plan for development or enhancement of a multi-user instrumentation center are also appropriate. In well justified cases the CRIF Program will also consider providing assistance for instrument operations and maintenance, not to exceed 10% of the acquisition cost per year for five years.

Proposal Evaluation

Review of instrumentation proposals may involve *ad hoc* mail review, panel review, or a combination thereof, and may include site visits. Evaluation of Chemistry Research Instrumentation proposals will be on the basis of the general criteria for review given above. Among the specific considerations for the Departmental Multi-user Instrumentation proposals are:

1. How does the proposed new or upgraded equipment impact the technical work of the department? Does the department have the technical expertise and infrastructure to make effective use of the new or enhanced equipment? Do prior research results from this department give confidence that the requested equipment will be used effectively? Will the research with this new equipment advance knowledge and understanding in the relevant fields? Is the plan for management and maintenance of the equipment appropriate and does it make possible wide usage of the equipment?

2. Is there a plan to use the new or enhanced equipment in teaching, training or learning? Will other institutions be involved? Do any of these plans enhance participation by underrepresented groups? Is there a plan to make the results of the work done using this equipment broadly available? How will the new or upgraded equipment impact the educational programs of the departments that use it?

In cases of comparable overall merit, priority will be given to supporting requests that would strengthen research activities already supported by the Division of Chemistry. Where appropriate, existing research project reviews and information on departmental strength (publications, education and training of chemistry students, development plans, extramural and institutional support) will be used by Chemistry Division staff along with external reviews to assess the overall merit of instrumentation proposals.

Proposal Format

Although the proposal format required to present the case for research instrumentation needs is somewhat different from that for research project proposals, the other requirements appropriate to all proposals submitted to NSF (as described in GPG) must be followed. Please consult GPG, Chapter II, for details. The title of the proposal should include the type of instrument requested, but not the manufacturer's name or the model number. An example of an appropriate title is: "Purchase (or Upgrade) of an X-Ray Diffractometer."

Brevity will assist reviewers and Foundation staff in dealing effectively with proposals. Therefore, the Project Description (including Results from Prior NSF Support, which is limited to five pages) may not exceed 15 pages. Results may be summarized in fewer than five pages, which would give the proposer the balance of the 15 pages for the Project Description. Figures, including charts, graphs, maps, photographs and other pictorial presentation are included in the 15-page limit. Conformance to the 15-page limit will be strictly enforced and may not be exceeded unless the deviation has been specifically authorized in writing prior to submission. Non-conforming proposals will be returned unreviewed.

The following topics must be addressed in the proposal (length suggestions are within the 15-page overall limit).

Results from Prior NSF Support (1-5 pages). If the PI(s) has(have) received NSF funding in the past FIVE years, information on prior awards is required. Please consult GPG for details. Results of prior awards from the CRIF program for the benefit of the department must be included, regardless of the identity of the PI on the prior award. Reviewers will be asked to comment on the quality of the prior work described in this section of the proposal.

Description of Instrument(s) and Rationale for Selection (1-3 pages). Describe in this section the instrument(s) requested and alternatives where appropriate. Special features needed in the requested instrument and any necessary accessories should be justified, both in this section and in the descriptions of research projects. For example, in a proposal for a high-field, multi-nuclear NMR spectrometer, the need for high-resolution, dispersion, and multinuclear capabilities must be justified by the proposed research uses and by departmental development strategies. If similar or related instruments exist in the department or elsewhere in the institution, the relation to the requested instrument should be indicated and the need for the additional instrument justified through usage data and by reference to new capabilities or enhanced capacity. Any inter-institutional cooperation for maximizing the effectiveness of this investment in infrastructure should be described.

Operation and Maintenance (1-3 pages). This section should specify how and by whom the requested instrumentation is to be operated and maintained, and how the operations and maintenance are to be financed. For related existing instrumentation, information on usage and downtime should be included. Pertinent data on income from, and cost of, instrument services for the preceding year, including user charges, salaries of support personnel, maintenance contracts, shop charges, and other expenses, should be included.

Proposed Research (5-10 pages). This section should summarize pertinent research projects in the context of the broad research themes of the major users of the proposed instrument(s). The combined research descriptions are limited to a total of 10 single-spaced pages. Research project summaries of major users should provide enough information for reviewers to assess scientific merit, the projected use of the proposed instrument, and the need for special features or accessories. Research descriptions should be provided for no more than six major users; other users should be listed by name only. Projects currently supported by the Chemistry Division should be identified. Projects ineligible for NSF support (e.g., drug development work) should not be included. Use no more than six references for each research description.

Biographical Sketches. This section should include short biographical sketches (one page each) for the major users and for the Head or Chairperson (designated as Principal Investigator). In addition each

user should provide a list of up to five publications most closely related to the proposed acquisition (see GPG, II.D.6.). To aid the NSF Program Director in identifying conflicts of interest that must be avoided during review, major users must include a list of researchers with whom they have collaborated during the past four years.

Current and Pending Support. Current research support data must be organized into a single table that summarizes all extant research support from all sources for all major users. Parallel duplicate submission of CRIF proposals to other agencies or patrons (not within NSF) is encouraged but must be disclosed in the proposal. (See GPG, II.D.8.)

2. PURCHASE OF DEPARTMENTAL RESEARCH INSTRUMENTATION FOR USE BY JUNIOR FACULTY IN ESTABLISHING THEIR ACADEMIC CAREERS

Proposals will be considered for the purchase of departmental instrumentation that will be used primarily by a junior faculty member in launching a research career. This program is designed to provide enhancements to startup funds normally provided for new faculty and provide additional flexibility to institutions for the investment of resources for research instrumentation. Proposals must place the requested instrumentation in context of the department's other instrumentation resources and needs, its commitment to development of research strength in focused areas, and its plans for so doing.

Eligibility

Department chairs may submit proposals to support the instrumentation needs of new faculty hired to develop academic careers involving both research and teaching in areas of science normally supported by the Chemistry Division. These awards are not intended to support instrumentation needs for senior or highly experienced investigators who have independent research careers. The junior faculty member **MUST MEET ALL** of the following requirements:

- be employed at an institution in the U.S., its territories or possessions, or the Commonwealth of Puerto Rico, which awards a baccalaureate or advanced degree in an appropriate department;
- not hold or have held a tenured position in such an institution on or before the award date;
- begin or have begun a tenure-eligible position within 15 months of the submission date.

Equipment may be requested for only one junior faculty member, although research projects may involve collaboration with others.

Deadline for Submission

Proposals must be received at NSF by the first Monday in July annually. Principal Investigators will be notified of the intended action on their proposals by the second Monday in December of the following fiscal year.

Eligible Costs

For successful proposals, the amount of the NSF award will be based on the net price of the instrumentation to the institution, including all academic discounts and other special purchase arrangements. Single research instruments, research instrumentation systems, and ensembles of research instruments that enable a particular research thrust may be requested. No funds will be provided for instrument maintenance and operation. Again, the CRIF Program requires no matching funds for the first $80,000 and will provide up to one-half of the funds in excess of $80,000 required for the purchase of departmental instrumentation for use by junior faculty in establishing their research careers. Matching funds must be in cash, not in-kind and be used towards the instrument(s) to be purchased.

Proposal Evaluation Criteria

Evaluation of these proposals will involve *ad hoc* mail review, panel review, or a combination thereof. These evaluations will be based on the standard NSF evaluation criteria given above, particularized for this specific activity. Among the specific considerations for the Junior Faculty Research Instrumentation proposals are:

1. How will the new equipment affect the research activities of the junior faculty member? Is it realistic to expect this faculty member to utilize the equipment effectively? Would the availability of this equipment impact the work of other faculty members at the institution? How does this new equipment fit into department plans for focused research activities? Does this equipment complement other instrumentation resources at the institution?

2. Is there a plan to use the new equipment in teaching, training or learning? At what level – graduate, undergraduate, other? Will the work done broaden the participation in science of underrepresented groups? Will the results of work done using this equipment be made broadly available to the general non-scientific community? What is the plan for doing this? How will research done with this equipment affect society at large?

Proposal Format

The format for these proposals should follow that described for proposals to purchase or upgrade departmental multi-user instrumentation adjusted as appropriate for a single primary user. As noted above, the head or chairperson of the department must serve as the Principal Investigator. The title of the proposal should include the generic type of instrumentation requested and the research area in which it will be used by the junior faculty member. An example of an appropriate title is: "Purchase of Electron Spectroscopy Instrumentation for Research in Dynamics of Heterogeneous Reactions."

3. INSTRUMENTATION DEVELOPMENT

To help ensure that advances in fundamental science and technology are rapidly incorporated into instrumentation of broad importance to the chemistry community, proposals for the design and construction of new chemistry research instruments are eligible for consideration. These proposals should follow the general guidelines for research project proposals as outlined in GPG. The proposal title should be of the form: "Development (Construction) of a New ..……..... for Chemistry Research."

Proposal Format

The Introduction or Background section of the proposal must present an analysis of the need for the proposed instrumentation, including a projection of the uses and users in chemistry research. This section should detail the advantages for research in chemistry with the new instrumentation. If the instrumentation is to be shared among multiple users in a Chemistry Department, brief descriptions of the research of the major users should be given.

The main body of the proposal should provide a detailed description of the proposed instrument, plans for its design and construction, an analysis of problems to be overcome, preliminary work already completed, feasibility analysis, and an estimated time schedule to completion. Include also plans for transferring new knowledge or technology to U.S. industrial or governmental laboratories or U.S. instrument manufacturers.

The budget section of proposals for instrument development should indicate the total cost for construction of the equipment, apportioning estimated costs between personnel, supplies, equipment, and other costs. Requests for personnel support must include a description of the responsibilities of project co-workers and explain why a given position is necessary for the completion of the design and construction of the new instrument. Sufficient detail should be given so that reviewers can analyze the cost of the new technology.

Eligible Costs

Although there is no fixed cost sharing requirement for instrument development and construction projects, institutional and industrial cost sharing is encouraged and is taken as an indication of the perceived importance by the institution of the proposed instrument development.

Proposal Evaluation Criteria

Evaluation of these proposals will involve *ad hoc* mail review, panel review, or a combination thereof. These evaluations will be based on the standard NSF evaluation criteria given above, particularized for this specific activity. Among the specific considerations for the Instrumentation Development proposals are:

1. Is the proposed instrument unique? How widely useful within the science community would such an instrument be? Do the specific plans in the proposal and the prior work of the investigators indicate that the instrumentation will be successfully developed and utilized? How widely accessible will the instrument be?

2. Is there a plan to use this new research capability in teaching, training or learning? Will the proposed instrumentation broaden the participation in science of underrepresented groups? Will other institutions have access to this equipment? Is there a plan to make the results of work done using this instrument broadly available? Are there plans to transfer the technology developed to U.S. industrial or governmental laboratories?

Deadline for Submission

Proposals for instrument development and construction projects must be received at NSF by the second Monday in January, annually. Proposals in this category will be evaluated as a group. Principal Investigators will be notified of the Foundation's intended action on their proposals by the second Monday in June of that year.

4. CHEMISTRY RESEARCH FACILITIES

The CRIF Program also accepts proposals for the support of major national or regional facilities, which would provide unique state-of-the-art instrumentation and resources for research to a broad community of users in the chemical sciences. This program is intended to complement, not duplicate, support for facilities and centers provided under other NSF programs such as those of NSF's Office of Science and Technology Infrastructure. Principal Investigators are encouraged to consider carefully which program is best suited for their research needs and must consult with Chemistry Division staff (including the submission of a pre-proposal) before submitting a full proposal for facility support to CRIF.

Definitions and General Considerations

A facility is distinctly different from a departmental instrument center. It provides for unique or nearly unique instrumentation that is either too expensive to be widely available or must be custom-made. A facility typically requires a permanent support staff to operate, maintain, and provide service to a national user community. It is anticipated that there will be one or only a few national facilities in a given technical area (e.g., high-field NMR spectroscopy, synchrotron beam lines, high-field ICR, or advanced computer systems).

These facilities are expected to serve the state-of-the-art instrumentation needs for a wide community of users and simultaneously to support core research in the development of next-generation instrumentation and instrumental methods. Facilities under this definition must not encroach upon the service functions that are available in the private sector. The proposal (and the pre-proposal) should document the need for the facility and describe the research community it would serve. Use of a facility might, for example, be divided into core research (15%) and host-institution research (10%), service to or collaboration with non-host-institution users (60%), and instrument improvement and development (15%).

The Chemistry Division does not set aside funds for establishment of a pre-determined number of facilities. It will consider each request on its own merits against other possible uses for the same funds. Because national or regional user facilities are expensive to maintain and will entail long-term commitments of NSF financial resources, it is anticipated that no more than one such facility can be established in any one fiscal year. Facility planners should anticipate the phasing out of NSF support after a 10-year period and should plan to build user fees and other partnership and cost-sharing arrangements to sustain operation.

Successful proposals will be supported by the Chemistry Division of NSF for a period of five years, with the intention to provide one five-year renewal if the facility is successful in its core research, service, and instrument development functions, and if this type of facility is still needed. Annual progress reports will be required and used to assess these factors. On-site evaluations of all aspects of the facility operation will be made during the award period. Renewal proposals must present a plan for the eventual transition from NSF support and a budget reflecting decreasing levels of NSF support over the last two years of the renewal five-year period.

Eligible Costs

All costs of establishing and maintaining a facility, except for building construction and renovation, are eligible. Facility organizers may request funds for:

- acquisition of new instrumentation (either purchased from a manufacturer or built at the site) to establish the facility;
- operation and maintenance, including support personnel;
- core research (including student support);

- instrumentation development, including regular upgrading of instrumentation to maintain state-of-the-art capabilities;

- salaries, travel, workshops, student training, supplies, participant support, and other miscellaneous expenses.

The budget section of a facility proposal should detail the full costs of capital equipment to be purchased or designed and constructed. Although there are no specific cost-sharing requirements for chemistry research facility proposals, institutional contributions will be taken as evidence of institutional support for the facility. Institutional or state cost-share commitments, whether for construction or renovation of space, capital equipment purchase, or salary support, must be stated explicitly. The budget section should make it clear how combined NSF, institutional, and user resources will be used to support all necessary costs.

Rationale for the Facility

Proposals for the support of a chemistry research facility must include a full description of the technical capabilities of the facility, what distinguishes it from a local, departmental, or university-wide facility, and the impact that these capabilities will make on new state-of-the-art chemical research. Investigators must identify the nature and size of the user community in the chemical sciences that will make principal use of the research facility, along with any evidence (e.g., citations of reports or studies) of that community's desire to pool resources in support of the facility.

Chemistry research facilities are intended, in part, to stimulate the development of new instrumentation or techniques; facilities proposals must therefore include a description of the instrument design or technique in sufficient detail for reviewers to evaluate the new technology and its potential benefit to chemical research. Transfer of new knowledge or technology to U.S. industrial or governmental laboratories or U.S. instrument manufacturers is an important way for fundamental research to contribute to U.S. economic growth. Plans for such transfer will be considered in evaluation of the proposal. Beneficial partnerships with private-sector instrument developers are encouraged.

Proposals for chemistry facilities must include descriptions of the provisions for service operations, maintenance and development. Important elements include the qualifications of the persons immediately in charge, support personnel at various levels, the management and external advisory structure, and the partners involved in instrument development. Proposals must indicate the intended sources of funds to meet personnel and maintenance costs. Requests for personnel support must include a description of the responsibilities of each position and why a given position is necessary for the successful operation of the facility. If user fees are involved, a description of how they will be assessed should be included. The proposal must include a management plan for dealing with questions of access by users.

Facility Proposal Format

Proposals for Chemistry Research Facilities should provide a title in the format: "National (or, "Regional) Chemistry Research Facility for ....." The body of the research proposal, exclusive of illustrations, required forms, biographical and budgetary materials, will be limited to 40 single-spaced pages. Within that overall page limitation, the proposal must address the following issues, item by item (length stipulations on individual proposal sections are only suggestions).

NSF Cover and Certification Page (NSF Form 1207, see GPG). Enter this program announcement number in the space indicated.

Supplementary Forms: Complete and attach one copy only of Form 1225 (Information About Principal Investigators/Project Directors).

Project Summary (1 page maximum). The project summary should serve as an "Executive Summary," of the rationale for the center, the intended user community, the nature of the facility to be established, the areas of research to be enhanced, and the principal instrument development goals.

Table of Contents. A table of contents is required, with page numbers keyed to required sections of the proposal.

Rationale for and Impact of Facility (5 pages). This introductory section should describe the need for the proposed facility: (1) the unique capabilities and services it will bring to research in the chemical sciences; (2) the community to be served (areas of chemistry, regional or national users, host institution faculty) by the facility; and (3) how it will contribute to meeting the research and educational goals of the host institution and research community. The rationale should summarize the planning history for the project, citing pertinent studies or reports. It should also describe how the facility will attract research workers and students, increase the number of students from underrepresented groups entering programs for advanced degrees in science and

engineering, and improve the quality of research training and experience.

Detailed Description of the Research Facility (5 pages). This section should provide a full description of the proposed research facility including location, size, and major equipment to be purchased or constructed, services to be provided, and core research areas to be developed or enhanced. This section should assess limitations and constraints and their potential impact on research, service and training activities. Investigators should indicate the percentages of time and space in the facility that will be devoted to service, core research, education and training, and instrument development.

In-House (Core) Research Activities (10 pages). This section should identify the senior on-site personnel using the facility for research, development and training, summarize their current research activities and describe the research projects to be conducted in and enhanced by the research facility. Numbers of additional personnel whose research and education would depend on the proposed facility (e.g., postdoctorates, graduate students, undergraduate students) should be estimated as closely as possible.

Instrumentation Development Plan (5 pages). The plan should detail the instrument improvement and development component and explain how resources of the facility will be targeted at developing the next generation of research equipment. Strategies to keep the proposed facility at the forefront of research in the identified field must be described and necessary equipment upgrades planned and budgeted. Investigators should identify connections with other research and development organizations, including instrument manufacturers in the private sector, and the roles each will play in development. The proposal must contain a plan for evaluation of feasibility of commercialization of the technical advances of the facility.

Service to the External Community (5 pages). Because CRIF facilities are few in number, they must serve a national or large regional user community. Describe in detail the plan for making the facility accessible to external users. Document the managerial, support personnel, advisory, and accounting structures necessary to fulfill the service objectives. Describe mechanisms for selecting proposals from users, for choosing among in-house activities, and for the allocation of resources. Provide a plan for assessing performance and results of all activities supported by the facility.

Facility Management Plan (3 pages). This section should describe the management plan for direction and operation of the proposed facility. The management plan must identify the facility director and any senior personnel (including their vitae in the "Biographical Information" section) involved in the day-to-day operation of the facility and indicate the percentage of time to be devoted by each to the facility. This section should also outline the structure that will be established to advise the facility's management on operations, direction, and external relations with users. The facility must have an external advisory committee satisfactory to the NSF.

Education and Outreach (3 pages). A facility is a unique resource for special education, for transfer of knowledge and technology, for exchanges of staff with other research organizations, and for outreach to communities currently underrepresented in science and engineering. Investigators should outline their plans to use the unique capabilities of a facility to contribute to a stronger infrastructure in the chemical sciences through education and outreach activities.

Five-Year Budget Estimate (3 pages explanation plus six budget pages on NSF Form 1030 -- five individual yearly and one total budget). This section should provide a detailed estimate and explanation of the total five-year budget projected for establishment and operation of the facility and of the portion that the NSF is being asked to fund. Explain the basis for any cost estimates. Specify the expected sources and estimated amounts of cost-shared or matching funds (for example, state appropriations, endowment, debt financing, industrial contributions, etc.) and when they will be available. Commitments of space, renovation, faculty, staff positions, or capital equipment should be detailed here, with estimated dollar values.

Biographical Sketches. Biographical sketches must be provided in the standard NSF format (1 page each, GPG, NSF Form 1361) for the facility director, for all senior personnel whose core research activities would make major use of the facility, and for any other senior personnel who would draw major salary support from the facility.

Current and Pending Support (2 tables). Current and pending support of two types must be summarized. In one table should be grouped necessary information about all current and pending support for the facility, including any support from any source, received or pending, for support, repair, renovation, replacement, or construction of the proposed or similar facilities in the previous five years. A second table should be used to summarize current and pending support

(agency, award number, total cost amount, expected duration, and topic) for all research projects of each senior investigator from the host institution involved in the operation, management, research or training functions of the facility.

Pre-Proposal

Pre-proposals are required to minimize expenditure of planning, writing, and reviewing time for proposals that might have limited prospects for success. The pre-proposal is primarily a concept paper. It is to be submitted in letter format, limited to eight pages, and it must bear an institutional endorsement. It must present evidence that the facility is needed, can have a major impact on chemical research, and can be established and maintained at the proposed site by the proposed principal staff. Information about projected users of the facility and the costs to establish and maintain it at the state-of-the-art are essential. Preliminary plans for outreach, education and training, transfer of knowledge to the scientific community, and proposed partnerships in development should be outlined. A summary of anticipated start-up and annual maintenance costs is required.

The pre-proposal is an extremely important document for those contemplating establishment of a chemistry research facility. Only a small number of pre-proposals will be judged strong enough to warrant the preparation of a full facilities proposal, so the pre-proposal must be compelling.

Evaluation Mechanisms, Criteria, and Deadlines

Facilities pre-proposals will be reviewed by a review panel. Full facility proposals will be reviewed by *ad hoc* mail review by scientific experts and an overview review panel, and a site visit may be required. These evaluations will be based on the standard NSF evaluation criteria given above, particularized for this specific activity. Application of these general criteria to the specific case of Research Facilities as defined here leads to consideration of the following specific issues:

- Competence of the facility management to meet multiple purposes of research, education, and service simultaneously;

- Merit of the facility to provide the state-of-the-art in chemical research;

of the cost. The CRIF Program has provided about 50- 60 instrumentation support awards in each of the last several years. These awards averaged approximately $150,000 each.

- Usefulness of the facility as expressed by long-term commitment of the submitting institution, support of a national or regional community of users, a plan for phase out of NSF support and leveraging of limited Federal resources;

- Anticipated effect on rapid, efficient development of instruments and effective transfer of new knowledge and technology to other sectors of the U.S. science and technology enterprise;

- Use of unique resources to enhance education and training of students;

- Participation of groups underrepresented in science and engineering;

- Cross-disciplinary research and transfer of knowledge.

Proposals and pre-proposals for new facilities will be accepted once a year. The deadline for submission of pre-proposals is December 1, annually. Providers of pre-proposals will be given preliminary notification by February 15 of their eligibility to submit a full proposal. Deadline for submission of full proposals is June 1 of that year. Ten copies of a facilities pre-proposal, including the original signature copy, should be sent to:

National Science Foundation
Proposal Processing Unit Room P-60
Attention: Chemistry Division-CRIF Program
4201 Wilson Boulevard
Arlington, VA 22230

AWARD INFORMATION

Proposals submitted in response to this announcement are considered unsolicited. The Chemistry Research Instrumentation and Facilities Program may provide funds for a less expensive or less sophisticated instrument than requested, if the proposal review indicates an alternative choice to be both appropriate to the research and more cost-effective. There is no NSF commitment to make any specific number of awards or to provide any specified fraction

For shared multi-user instrumentation and instrumentation for use by junior faculty no matching funds are required for the first $80,000; a maximum

of one-half of the funds requested in excess of $80,000 will be provided. The threshold value of $80,000 will be reviewed periodically for its appropriateness.

In the last full facilities competition, five full proposals were invited from nine pre-proposals and one award was made. It is anticipated that no more than one new facility will be initiated in any year.

Further inquiries concerning this program may be directed to:

Chemistry Research Instrumentation and
Facilities Program
Chemistry Division - Room 1055
National Science Foundation
4201 Wilson Boulevard
Arlington, VA 22230
Tel: (703)-306-1849

OTHER NSF INSTRUMENTATION PROGRAMS

For related areas of research activity, including biochemistry, atmospheric and marine chemistry, atomic and molecular physics, chemical engineering, and materials research, funds for shared instrumentation should be sought from other appropriate NSF Divisions (see **Guide to Programs**, NSF 95-138).

The CRIF Program cooperates with other NSF instrumentation programs in the joint review and co-funding of multidisciplinary, multi-user instrument proposals for research uses which cross NSF divisional lines. For instructional instrumentation needed for undergraduate educational purposes in chemistry, application should be made through the Instrumentation and Laboratory Improvement Program described in Undergraduate Education (NSF 97-29).

Related NSF programs for research instrumentation and instrument development are listed below. In divisions that have no separate instrumentation program, instrumentation needs are provided for in regular research grant programs.

NSF 96-50	Earth Sciences Research at the National Science Foundation. Instrumentation and Facilities
NSF 97-29	Instrumentation and Laboratory Improvement Program
NSF 94-108	Instrumentation for Materials Research
NSF 96-113	Instrumentation Grants for Research in Computer and Information Sciences and Engineering
NSF 95-37	Multi-User Biological Equipment and Instrumentation Resources. Instrument Development for Biological Research
NSF 97-64	Small Business Innovation Research
NSF 97-15	Small Business Technology Transfer

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